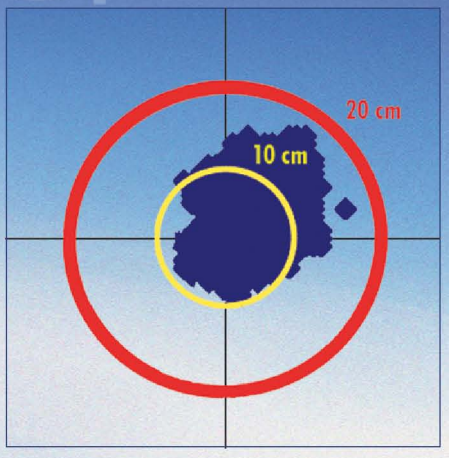
STARFIRE™ NETWORK

gps services



The StarFire™ Network is the world's first Global Satellite Based Augmentation System (GSBAS) capable of real-time decimeter accuracy. Performance is no longer a function of your distance from a reference station, so you have the freedom to use StarFire anywhere in the world.

METHODOLOGY

The StarFire Network is a major advance from earlier ground based augmentation systems because it considers each of the GPS satellite signal error sources independently. GPS satellite orbit and clock corrections are calculated from a global tracking network of dual frequency receivers. These corrections are transmitted via Inmarsat satellite links direct to StarFire receivers, resulting in minimal data latency and worldwide operation from 75 degrees North to 75 degrees South. All StarFire receivers use a dual frequency GPS receiver that measures the ionospheric delay for each satellite. Tropospheric zenith delays are calculated from a multi-state time and position model aided by redundant satellite observables.

RELIABILITY

Redundant data links, geographically separated processing hubs and dual satellite uplink equipment ensure continuous reliable positioning. The system is inherently robust with the ability to calculate a full set of corrections even if multiple reference stations were to become unavailable.

APPLICATIONS

StarFire receivers are available as fully integrated units or modular systems. Applications that can benefit from StarFire performance, accuracy and availability include:

- Land Survey
- Offshore Positioning
- Precision Agriculture
- Aerial Photogrammetry and LIDAR
- GIS and Asset Mapping
- Machine Control

Global real-time decimeter positioning with no base station

www.jpsurveys.com

JPSURVEYS

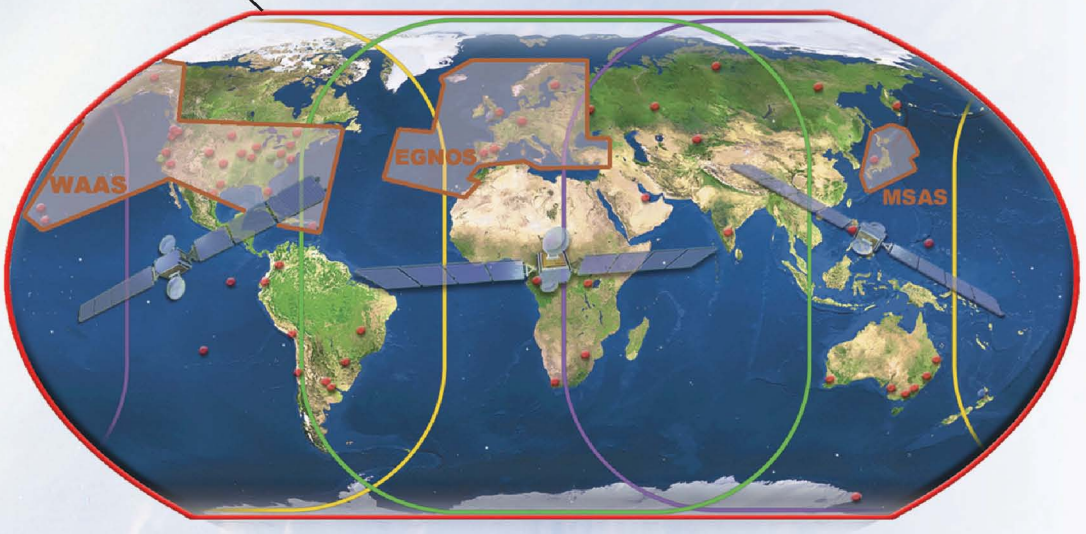
Jurukur Perunding Services Sdn Bhd
Tel : +603-5623 3228, Fax : +603-8062 2999
email : mapping@jpsurveys.com

NAVCOM
A John Deere Company

20780 Madrona Avenue, Torrance, CA 90503 • tel: + 1 310.381.2000 • fax: + 1 310.381.2001 • sales@navcomtech.com

STARFIRE™ NETWORK

StarFire Coverage Area



StarFire reference stations, StarFire GSBAS and SBAS coverage areas

SYSTEM INTEGRITY

A global network of dual frequency GPS receivers provides raw data every second via reliable redundant data links to two network processing centers located in Torrance, (S.W., USA) and Moline, (N.E., USA). These receivers are tied to the latest realization of the International Terrestrial Reference Frame (ITRF) coordinate system. StarFire's primary time reference is coupled to the International Atomic Time standard.

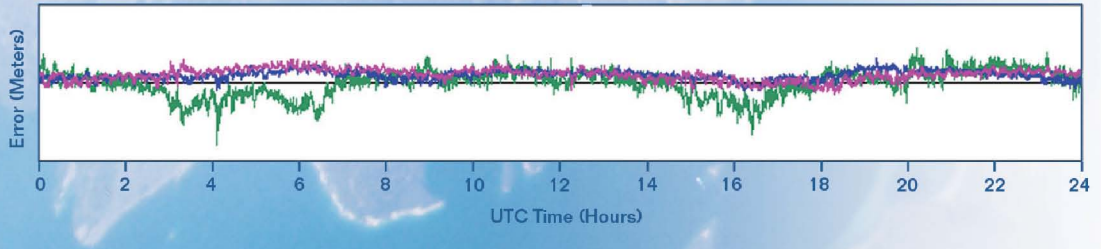
The network is a fully automated continuously self-monitoring system overseen around the clock by StarFire Network operators. The GSBAS algorithms developed by NavCom are based on technology licensed from NASA's Jet Propulsion Laboratory. Orbit and clock corrections from both processing centers are distributed via dedicated circuits with multiple communication backups to three Inmarsat satellite uplink stations. An independent network of StarFire user equipment continuously monitors system accuracy to ensure maximum reliability.

PERFORMANCE

Using any of NavCom's StarFire GPS receivers provides better than 10 cm horizontal and 15 cm vertical accuracy (1 sigma) as shown in the plot below.

Unlike DGPS positions that are relative to the reference station location, StarFire produces absolute, ITRF positions anywhere, any time. StarFire accuracy is independent of the distance to the nearest reference station.

	East	North	Vertical
Mean Error (meters)	0.04	0.05	-0.01
Standard Deviation (meters)	0.03	0.04	0.09



JPSURVEYS
Jurukur Perunding Services Sdn Bhd
Tel : +603-5623 3228, Fax : +603-8062 2999
email : mapping@jpsurveys.com